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“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 7354-1 (1975): Guide on reliability of electronic and electrical items, Part 1: Preliminary reliability considerations [LITD 2: Reliability of Electronic and Electrical Components and Equipment]



“ज्ञान से एक नये भारत का निर्माण”

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“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS : 7354 (Part I) - 1975
(Reaffirmed 1982)

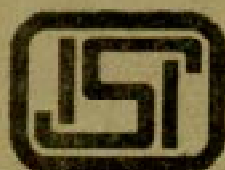
Indian Standard

GUIDE ON RELIABILITY OF ELECTRONIC
AND ELECTRICAL ITEMS

PART I PRELIMINARY RELIABILITY CONSIDERATIONS

(First Reprint APRIL 1984)

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INDIAN STANDARDS INSTITUTION
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*Indian Standard*GUIDE ON RELIABILITY OF ELECTRONIC
AND ELECTRICAL ITEMS

PART I PRELIMINARY RELIABILITY CONSIDERATIONS

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Indian Standard

GUIDE ON RELIABILITY OF ELECTRONIC AND ELECTRICAL ITEMS

PART I PRELIMINARY RELIABILITY CONSIDERATIONS

0. FOREWORD

0.1 This Indian Standard (Part I) was adopted by the Indian Standards Institution on 30 April 1975, after the draft finalized by the Reliability of Electronic and Electrical Components and Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard is not exhaustive and contains only certain basic aspects which will be pertinent to designer, manufacturer and user.

0.3 This standard is largely based on IEC Publication 272 (1968) ' Preliminary reliability considerations ' issued by the International Electrotechnical Commission.

0.4 This standard is one of a series of Indian Standards for reliability of electronic and electrical components and equipment. A list of standards published so far in this series is given on page 6.

1. SCOPE

1.1 This standard (Part I) deals with the preliminary reliability considerations intended for electronic and electrical items.

NOTE — An *item* is defined as electronic or electrical part, component, sub-assembly, equipment, sub-system or system that can be individually considered and separately tested [see 2.1 of IS : 1885 (Part XXXIX)-1974*].

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions and explanation of terms given in IS : 1885 (Part XXXIX)-1974* shall apply.

3. CONCEPT OF RELIABILITY

3.1 Need for Reliability Assurance—The purchaser of an equipment or system may require from the manufacturer adequate assurance as to satisfactory and continued performance in accordance with the purchase

*Electrotechnical vocabulary: Part XXXIX Reliability of electronic and electrical items.

specification. Likewise, the manufacturer of an equipment or system may require similar assurance from the suppliers of the various items used for the construction of the equipment of system.

3.2 Assessment of Reliability — Reliability assessment requires a forecasting activity which is based upon failure information, item design considerations and the use of statistics applied in both of these areas.

3.3 Requirement and Determination of Compliance

3.3.1 Statements of reliability requirements shall be contained in the specification documents of items.

3.3.2 These requirements shall be expressed in terms of the specified life and/or other reliability characteristics with a statement of the environments, time periods and extent of applicability of the requirement, for example, identification (such as, by serial number or model), service conditions, etc.

3.3.3 The conditions of compliance determination and time period shall be explicitly stated. Incentives or penalties associated with compliance or non-compliance, if any, should be expressed in appropriate contractual documents, but not in the specification.

3.4 Maintenance of Satisfactory Performance — The attainment of reliability in an equipment may require periodic servicing which is essentially a matter of checking performance to locate items which require adjustment (calibration, tuning, etc) or which shall be replaced prior to their wear-out.

4. TIME ASPECTS OF RELIABILITY

4.1 Item Maturity Phases — Reliability can be completely assessed only when an item is or has been in production and use. However, less complete information can be obtained during previous maturity phases (for example, pre-production, production test, field trials, etc). The actual phase to which the reliability assessment refers shall, therefore, be stated in the purchase specification. In all cases, numbers of items involved in the reliability assessment shall be made known.

4.2 Applicable Time Periods—Relevant specifications should state which time periods are applicable to the assessment of reliability. Information should be supplied by the manufacturer upon all relevant portions of the useful life of the item, such as storage, handling, operation and maintenance.

5. FAILURES OF ITEMS

5.1 Reliability Data on Items — In each case, the relevant specification shall define what constitutes a failure. The reliability of items can be

expressed in terms of failure rate, mean time between failures, and/or other characteristics. In deriving reliability characteristics, it should be stated whether the assumed, assessed, extrapolated or predicted failure values are used.

5.2 Component or Part Failure Mechanisms — A knowledge of the essential mechanisms of failure will assist both in the choice of the most suitable components or parts and in their correct operation in order to improve the over-all reliability.

6. SOURCES OF INFORMATION FOR RELIABILITY

6.1 Field Performance Reports — A failure report shall state the conditions under which failure occurs and whether such a failure is due to inherent weakness, misuse, or an external cause. The time history and the total number of items under observation shall also be stated [*see* IS : 7354 (Part IV)-1974*].

6.2 Test on Items — Test reports shall provide detailed information as to the electrical and environmental conditions under which such tests have been conducted. When accelerated testing methods are employed, they shall not be such as to change the essential mechanism(s) of failure.

6.3 Standardized Persentation of Reliability Data — It is most important that standardized methods of presentation be employed, and that it is stated whether the information is derived from testing or from field performance reports, in order that all compatible information can be collated and analyzed [*see* IS : 7354 (Part III)-1975†].

*Guide on reliability of electronic and electrical items: Part IV Collection of reliability, availability and maintainability data from field performance.

†Guide on reliability of electronic and electrical items: Part III Presentation of reliability data on electronic or electrical components (or parts).

INDIAN STANDARDS

ON

RELIABILITY OF ELECTRONIC AND ELECTRICAL COMPONENTS AND EQUIPMENT

IS :

- 1885 (Part XXXIX)-1974 Electrotechnical vocabulary: Part XXXIX Reliability of electronic and electrical items**
- 7354 Guide on reliability of electronic and electrical items:**
 - 7354 (Part I)-1975 Part I Preliminary reliability considerations**
 - 7354 (Part II)-1975 Part II Managerial aspects of reliability**
 - 7354 (Part III)-1975 Part III Presentation of reliability data on electronic and electrical components (or parts)**
 - 7354 (Part IV)-1974 Part IV Collection of reliability, availability and maintainability data from field performance**
 - 7354 (Part V)-1975 Part V Inclusion of lot-by-lot and periodic inspection procedures in specifications for electronic and electrical components (or parts)**
 - 7354 (Part VI)-1975 Part VI Inclusion of reliability clauses into the specifications for components (or parts)**

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s ²
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m ²
Frequency	hertz	Hz	1 Hz = 1 c/s (s ⁻¹)
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m ²

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